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APPLICATION NUMBER: 60/496,498  
FILING DATE: August 20, 2003  
RELATED PCT APPLICATION NUMBER: PCT/US04/26886

Certified by



Jon W Dudas

Acting Under Secretary of Commerce  
for Intellectual Property  
and Acting Director of the U.S.  
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# PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR § 1.53(c).

Docket Number: PDC-0009

Type a plus  
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17959 U.S. PTO  
60/496498  
+  
08/20/03

EXPRESS MAIL LABEL NO:

251288119US

DATE OF DEPOSIT: August 20, 2003

251288119US

## INVENTOR(S)/APPLICANT(S)

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(FIRST AND MIDDLE [IF ANY])

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FAMILY NAME OR  
SURNAME

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RESIDENCE (CITY AND EITHER STATE  
OR FOREIGN COUNTRY)

Lancaster, Pennsylvania

☐ Additional inventors are being named on the separately numbered sheets attached hereto

## TITLE OF THE INVENTION (280 characters max)

Improved Engagement Mechanism for Portable Fire Hydrant

## CORRESPONDENCE ADDRESS

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## ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification Number of Pages: 5  
☒ Drawing(s) Number of Sheets: 15

☐ Claims (optional)  
☒ Other (specify) U.S. Patent No. 5,901,738

## METHOD OF PAYMENT (check one)

☒ A check or money order is enclosed to cover the Provisional filing fee:  
☒ \$80.00 Small Entity  
☐ \$160.00 Large Entity

☐ The Commissioner is hereby authorized to charge filing fee and credit Deposit Account No.: 23-3050

☒ The Commissioner is hereby authorized to charge Deposit Account No. 23-3050 any fee deficiency or credit account for any overpayment.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are

Respectfully submitted,

SIGNATURE

TYPED or PRINTED NAME Daniel D. Biesterveld

Date: Aug 20, 2003  
REGISTRATION NO. 45,898  
(if appropriate)

PROVISIONAL APPLICATION FILING ONLY

**Improved engagement mechanism for portable fire hydrant**

The enclosed figures and descriptions relate to improved engagement mechanisms for portable fire hydrants. The design and function of portable fire hydrants is disclosed in U.S. Pat. No. 5,901,738, included in its entirety with this provisional application.

1. Operation of the 3 in 1 opening system.
2. Hydraulics that engage and release the valve opening system.
3. Closed loop pneumatic/hydraulic sealing system.
4. Latching mechanism operating from 2 pins.
5. Swivel connection system allowing 360 degree orientation.
6. Three in one release mechanism.
7. Two sets of mechanical pistons operating from a common central rod.

Three key operation process.

Through one simple up and down motion moving at an 8" stroke at the end of the handle, the hydraulically operated, 1" diameter, center rod causes 3 individual functions:

- a. The first 3 strokes engage the locking pins preventing vertical removal of the hydrant but allowing 360 degree orientation engagement to the below grade locking collar. The locking pins can be mechanically, pneumatically, and/or hydraulically operated by a cam on the center rod.
- b. Strokes 4, 5 and 6 inflate the pneumatically and/or hydraulically operated inflatable seal to seal the hydrant to the below grade coupling. The seal can be inflated using the same cam used to engage the locking pins or a second cam located on the center rod.
- c. Strokes 7 through 28 open the below grade 6 1/2" valve.

All this happens in less than 20 seconds, whereas operation of current hydrant designs takes 120 – 180 seconds.

This unique operation allows the physics of 75 pounds of force at the operating lever to open a 30% larger valve than the current 250 pound maximum for a 5 1/4" valve.

The various functions performed by the hydraulic center rod can be performed in alternate order. Further, the various functions performed by the hydraulic center rod can be performed simultaneously. For example, the seal can begin inflation shortly after the locking pins begin their extension but before they are fully extended.

Three embodiments of the improved engagement mechanism are provided as follows:

Embodiment 1 – A mechanical pin-lock (Figures 1-4)

Embodiment 2 – Tandem cylinders for pin-lock and seal inflation (Figures 5-8)

Embodiment 3 – Single cylinder for pin-lock and seal inflation (Figures 9-12)

**Drawing Description:**

Figure 1A is a color sectional view of embodiment 1;

Figure 1B is the same as Figure 1A except for color;

Figure 2 is a top view of embodiment 1;

Figure 3 shows section A-A of Figure 2;

Figure 4 is an exploded view of the circled portion in Figure 3;

Figure 5A is a color sectional view of embodiment 2;

Figure 5B is the same as Figure 5A except for color;

Figure 6 is a top view of embodiment 2;

Figure 7 shows section A-A of Figure 6;

Figure 8 is an exploded view of the circled portion in Figure 7;

Figure 9A is a color sectional view of embodiment 3;

Figure 9B is the same as Figure 9A except for color;

Figure 10 is a top view of embodiment 3;

Figure 11 shows section A-A of Figure 10; and

Figure 12 is an exploded view of the circled portion in Figure 11.

## Embodiment 1 (Figures 1-4)

### MECHANICAL PIN LOCK OPERATION DESCRIPTION:

OPERATING THE PUMP HANDLE CAUSES HYDRAULIC PRESSURE TO BE EXERTED AGAINST THE PISTON WHICH DRIVES THE ACTUATING ROD DOWNWARD. THE CAM COLLAR, WHICH IS RIGIDLY FIXED TO THE ACTUATING SHAFT (VIA DOWEL PIN IN THIS EXAMPLE) IS FORCED DOWNWARD AT THE SAME TIME. THE TAPER ON THE CAM COLLAR EXERTS HORIZONTAL FORCE ON THE SPRING PLUNGERS WHICH ARE THREADED INTO THE LOCKING PINS CAUSING THE LOCKING PINS TO MOVE HORIZONTALLY.

THE LOCKING PINS ENGAGE IN A GROOVE LOCATED IN THE BELOW GROUND PART OF THE SYSTEM TO PREVENT THE HYDRANT FROM BEING REMOVED VERTICALLY. THE PINS ENGAGED IN THE GROOVE ALLOW 360° ROTATION OF THE HYDRANT FOR ORIENTATION. ONCE THE LOCKING PINS HAVE BEEN EXTENDED, THE INFLATABLE SEAL IS INFLATED TO EFFECT A WATER-TIGHT SEAL BETWEEN THE HYDRANT AND THE BELOW-GRADE COLLAR.

WHEN CLOSING THE VALVE, THE HYDRAULIC PRESSURE IS REMOVED FROM THE PISTON ALLOWING THE SPRING IN THE BELOW-GRADE SYSTEM TO RAISE THE ACTUATING ROD. THE RETURN SPRINGS RETRACT THE LOCKING PINS DISENGAGING THEM FROM THE BELOW-GRADE COLLAR. ONCE THE SEAL HAS BEEN DEFLATED, THE HYDRANT CAN BE REMOVED FROM THE BELOW-GROUND SYSTEM.

## Embodiment 2 (Figures 5-8)

### TANDEM MECHANICAL PIN LOCK AND HYDRAULIC SEAL INFLATION OPERATION DESCRIPTION:

OPERATING THE PUMP HANDLE CAUSES HYDRAULIC PRESSURE TO BE EXERTED AGAINST THE PISTON WHICH DRIVES THE ACTUATING ROD DOWNWARD. THE CAM COLLAR, WHICH IS RIGIDLY FIXED TO THE ACTUATING SHAFT (VIA DOWEL PIN IN THIS EXAMPLE) IS FORCED DOWNWARD AT THE SAME TIME. THE CAM COLLAR HAS TWO (2) TAPERS, ONE THAT OPERATES THE LOCKING PIN AND ONE THAT OPERATES THE HYDRAULIC SEAL INFLATION. THE UPPER CAM EXERTS HORIZONTAL FORCE ON THE SPRING PLUNGERS WHICH ARE THREADED INTO THE HYDRAULIC PISTONS CAUSING THE PISTONS TO MOVE HORIZONTALLY. HYDRAULIC FLUID IN THE CHAMBER IS COMPRESSED AND FORCED THROUGH THE ORIFICE TO INFLATE THE INFLATABLE SEAL TO CREATE A WATER-TIGHT SEAL BETWEEN THE HYDRANT AND THE BELOW GROUND COLLAR.

THE LOWER CAM EXERTS HORIZONTAL FORCE ON THE SPRING PLUNGERS WHICH ARE THREADED INTO THE LOCKING PINS CAUSING THE PINS TO MOVE HORIZONTALLY. THE LOCKING PINS ENGAGE IN A GROOVE LOCATED IN THE BELOW GROUND PART OF THE SYSTEM TO PREVENT THE HYDRANT FROM BEING REMOVED VERTICALLY. THE PINS ENGAGED IN THE GROOVE ALLOW 360° ROTATION OF THE HYDRANT FOR ORIENTATION.

WHEN CLOSING THE VALVE, THE HYDRAULIC PRESSURE IS REMOVED FROM THE PISTON ALLOWING THE SPRING IN THE BELOW-GRADE SYSTEM TO RAISE THE ACTUATING ROD. THE RETURN SPRINGS RETRACT THE LOCKING PINS DISENGAGING THEM FROM THE BELOW-GRADE COLLAR. AN ADDITIONAL SET OF RETURN SPRINGS RETRACT THE HYDRAULIC PISTONS AND DRAW THE HYDRAULIC FLUID FROM THE INFLATABLE SEAL BACK INTO THE FLUID CHAMBER. ONCE THE SEAL HAS BEEN DEFLATED AND THE PINS RETRACTED THE HYDRANT CAN BE REMOVED FROM THE BELOW-GROUND SYSTEM.

### Embodiment 3 (Figures 9-12)

#### HYDRAULIC PIN-LOCK AND INFLATABLE SEAL OPERATION DESCRIPTION:

OPERATING THE PUMP HANDLE CAUSES HYDRAULIC PRESSURE TO BE EXERTED AGAINST THE PISTON WHICH DRIVES THE ACTUATING ROD DOWNWARD. THE CAM COLLAR, WHICH IS RIGIDLY FIXED TO THE ACTUATING SHAFT (VIA DOWEL PIN IN THIS EXAMPLE) IS FORCED DOWNWARD AT THE SAME TIME. THE TAPER ON THE CAM COLLAR EXERTS HORIZONTAL FORCE ON THE SPRING PLUNGERS WHICH ARE THREADED INTO THE HYDRAULIC PISTONS CAUSING THE HYDRAULIC PISTONS TO MOVE HORIZONTALLY.

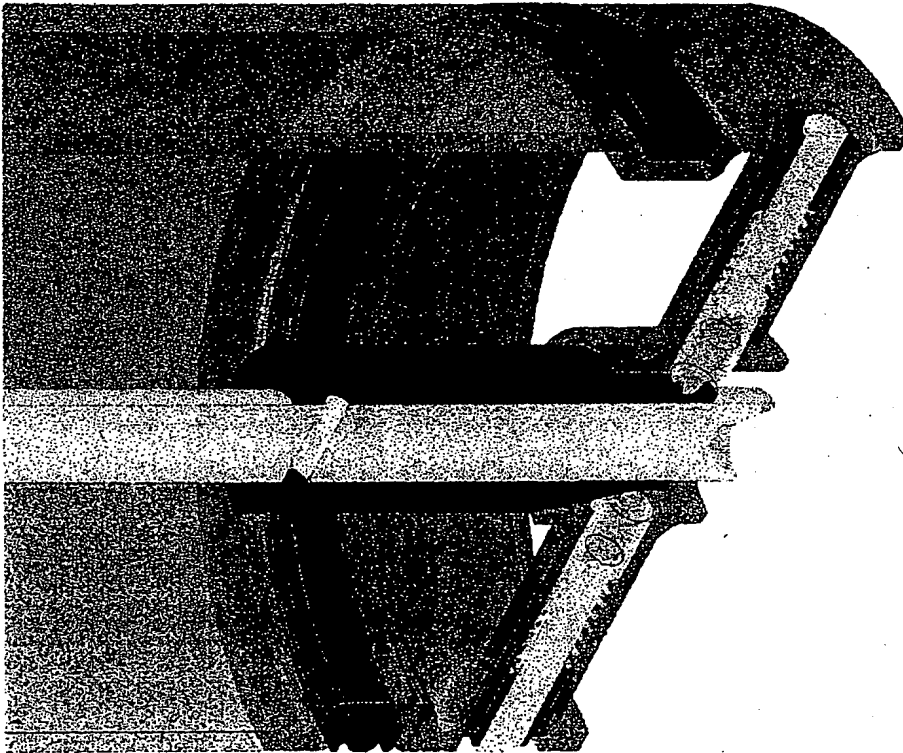
THE HYDRAULIC PISTONS COMPRESS HYDRAULIC FLUID CONTAINED IN THE CHAMBER AND FORCE THE FLUID THROUGH THE PASSAGEWAY TO INFLATE THE INFLATABLE SEAL. THE OVER-RIDE SPRINGS PUSH THE LOCKING PINS OUTWARD TO ENGAGE IN A GROOVE LOCATED IN THE BELOW GROUND PART OF THE SYSTEM TO PREVENT THE HYDRANT FROM BEING REMOVED VERTICALLY. THE PINS ENGAGED IN THE GROOVE ALLOW 360° ROTATION OF THE HYDRANT FOR ORIENTATION. ONCE THE LOCKING PINS HAVE BEEN EXTENDED, THE OVER-RIDE SPRINGS ALLOW THE HYDRAULIC PISTONS TO CONTINUE MOVING TO DISPLACE MORE FLUID INTO THE INFLATABLE SEAL.

WHEN CLOSING THE VALVE, THE HYDRAULIC PRESSURE IS REMOVED FROM THE ACTUATING ROD PISTON ALLOWING THE SPRING IN THE BELOW-GRADE SYSTEM TO RAISE THE ACTUATING ROD. THE RETURN SPRINGS RETRACT THE HYDRAULIC PISTONS AND DRAW THE HYDRAULIC FLUID FROM THE INFLATABLE SEAL BACK INTO THE HYDRAULIC FLUID CHAMBER. A MECHANICAL CONNECTION BETWEEN THE HYDRAULIC PISTONS AND THE LOCKING PINS RETRACT THE LOCKING PINS DISENGAGING THEM FROM THE BELOW-GRADE COLLAR. ONCE THE SEAL HAS DEFLATED AND THE LOCKING PINS RETRACTED, THE HYDRANT CAN BE REMOVED FROM THE BELOW-GROUND SYSTEM.



Docket No.: PDC-0009  
App No.: Not yet assigned  
Title: Improved Engagement Mechanism for Portable Fire Hydrant  
Inventors: Wayne Edwin Miller  
Attorney: Daniel D. Biesterveld  
Sheet 1 of 15

Filed: Herewith  
Phone: (215) 568-3100



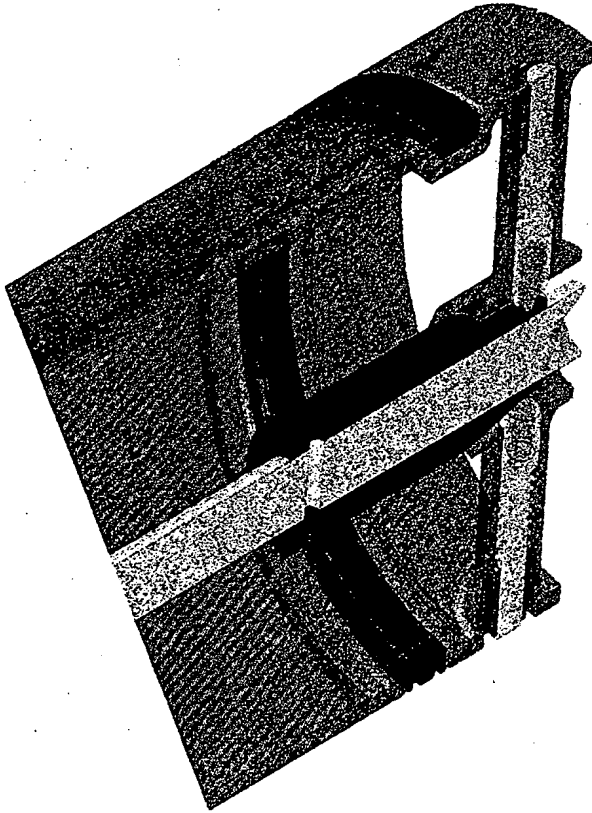
**Figure 1A**

SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL



Docket No.: PDC-0000  
App No.: Not yet assigned  
Title: Improved Supplement Mechanism for Portable Fire Hydrant  
Inventor: Wayne Edwin Miller  
Attorney: David D. Binsted  
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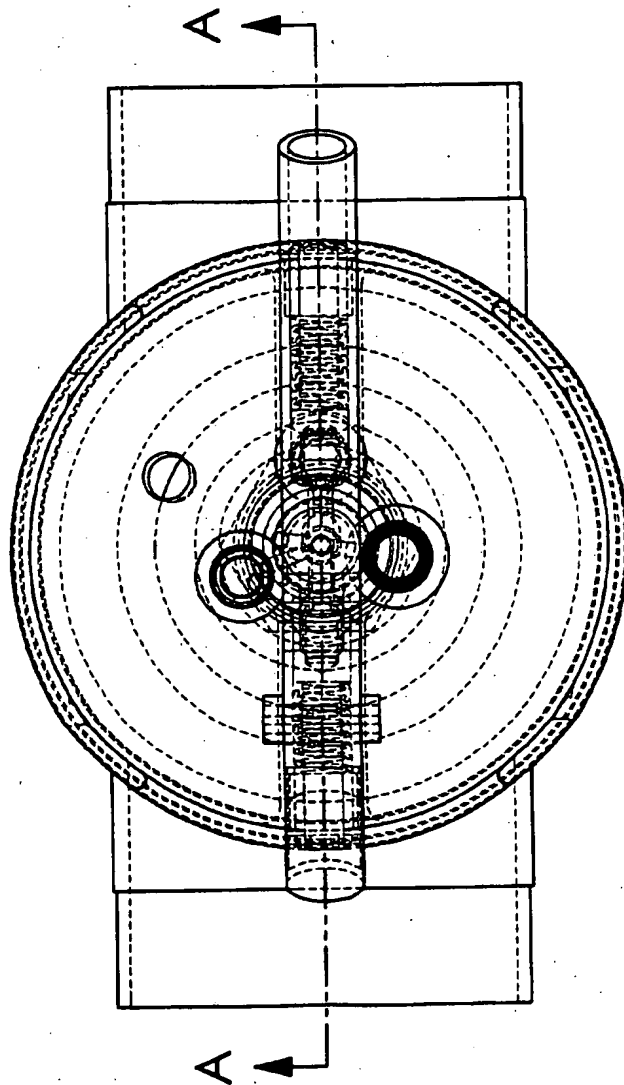
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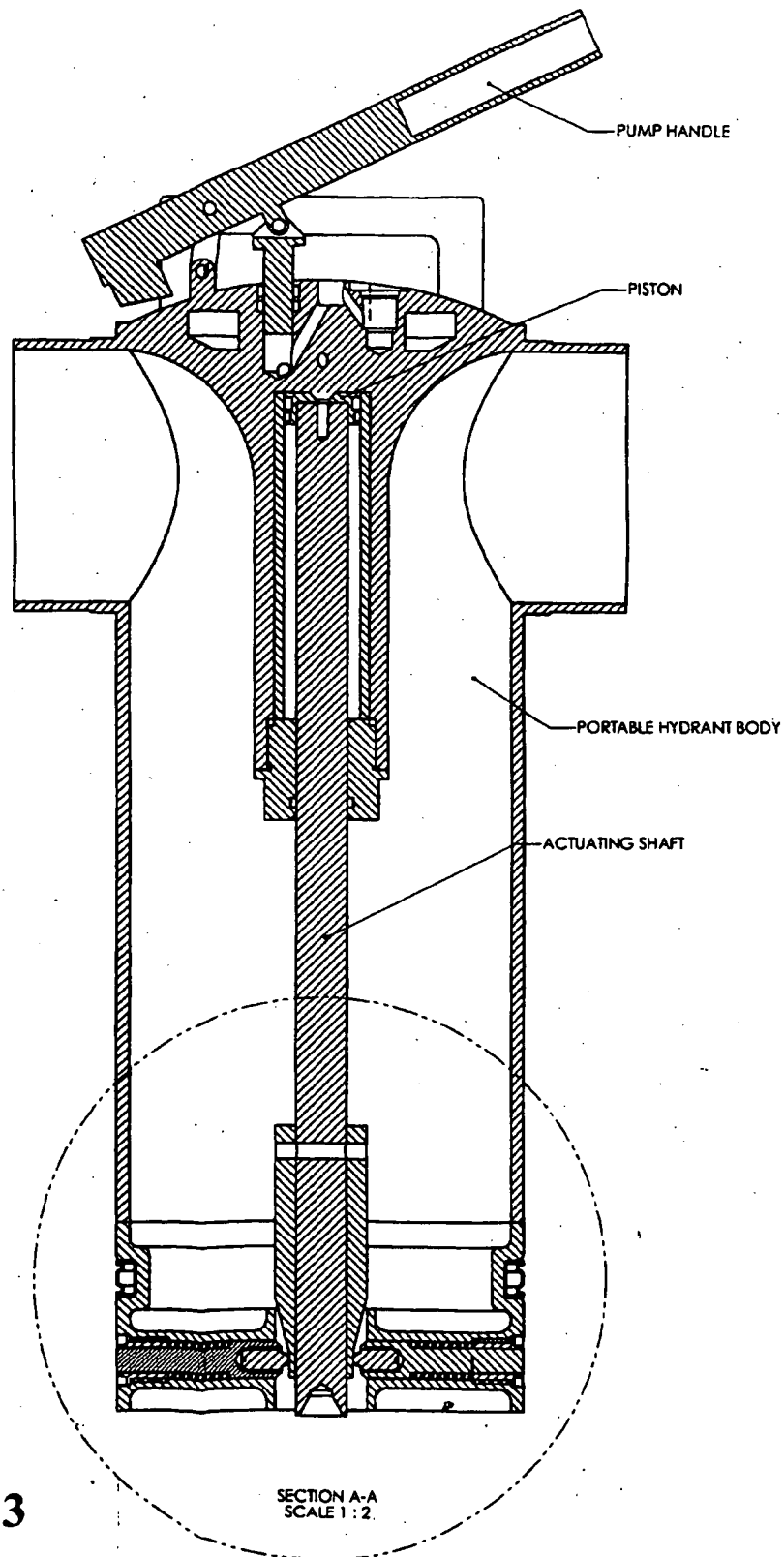


**Figure 1B**  
SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL

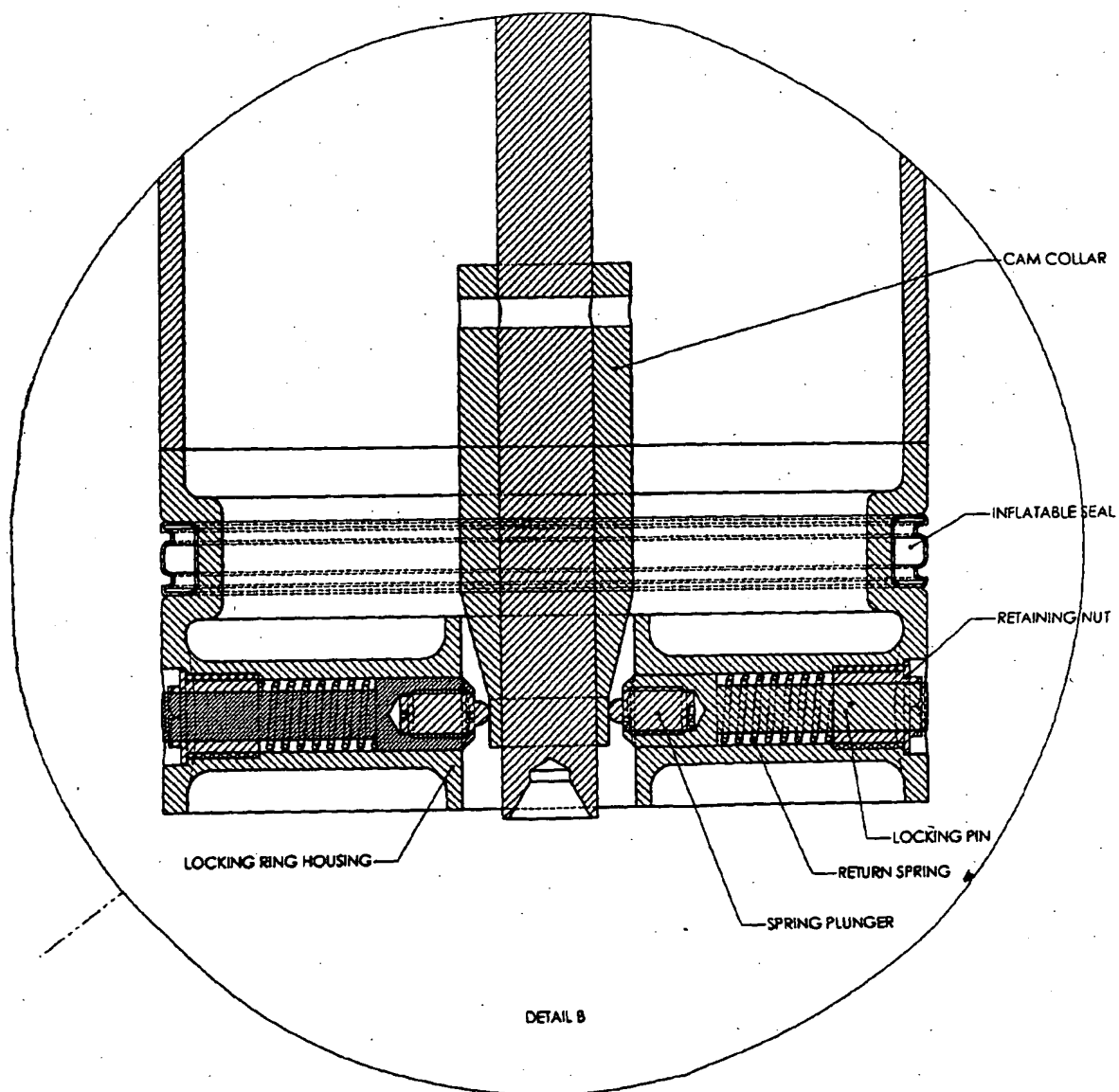


Figure 2





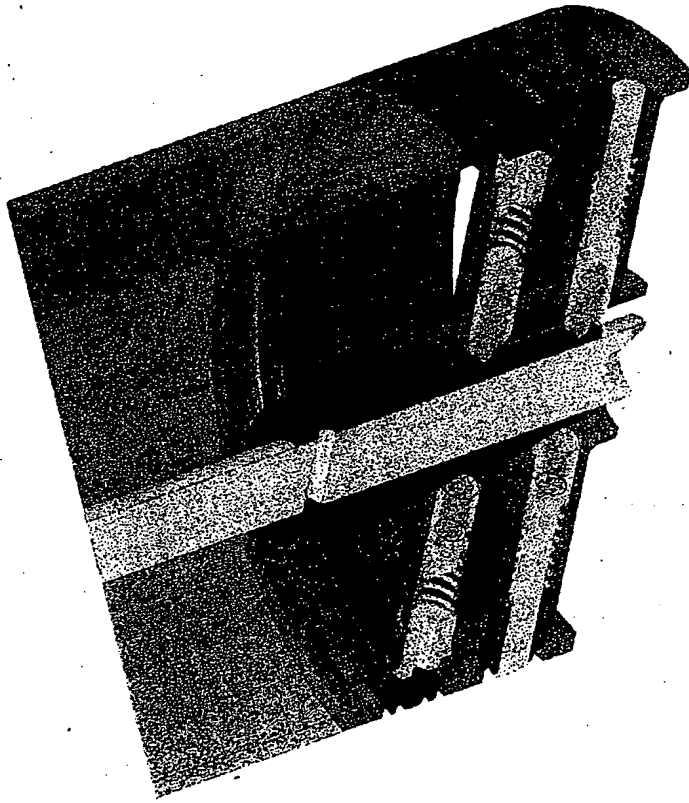
**Figure 3**



**Figure 4**

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App No.: Not yet assigned  
Title: Improved Engagement Mechanism for Portable Fire Hydrant  
Inventor: Wayne Edwin Miller  
Attorney: Daniel D. Binsterveld  
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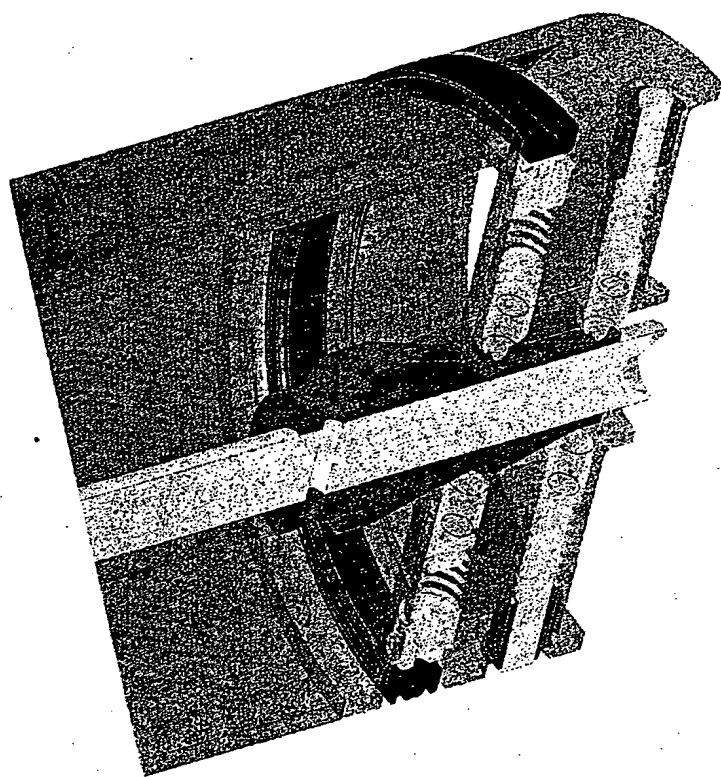


**Figure 5A**  
SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL



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Inventor: Wayne Edwin Miller  
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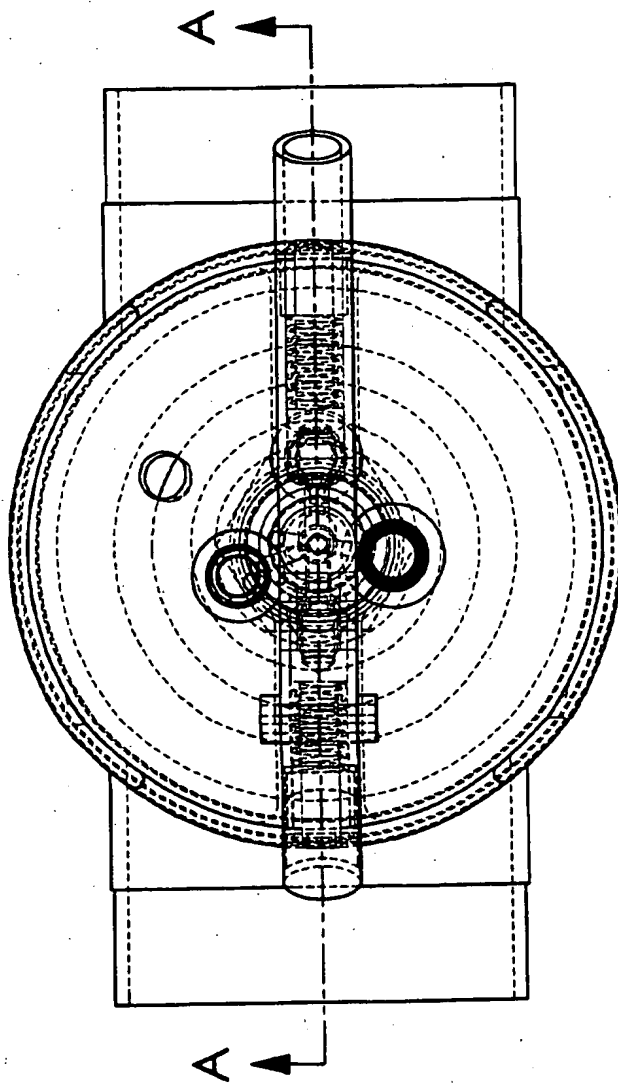


**Figure 5B**

SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL



Figure 6





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Inventors: Wayne Edwin Miller  
Attorney: Daniel D. Biesterveld  
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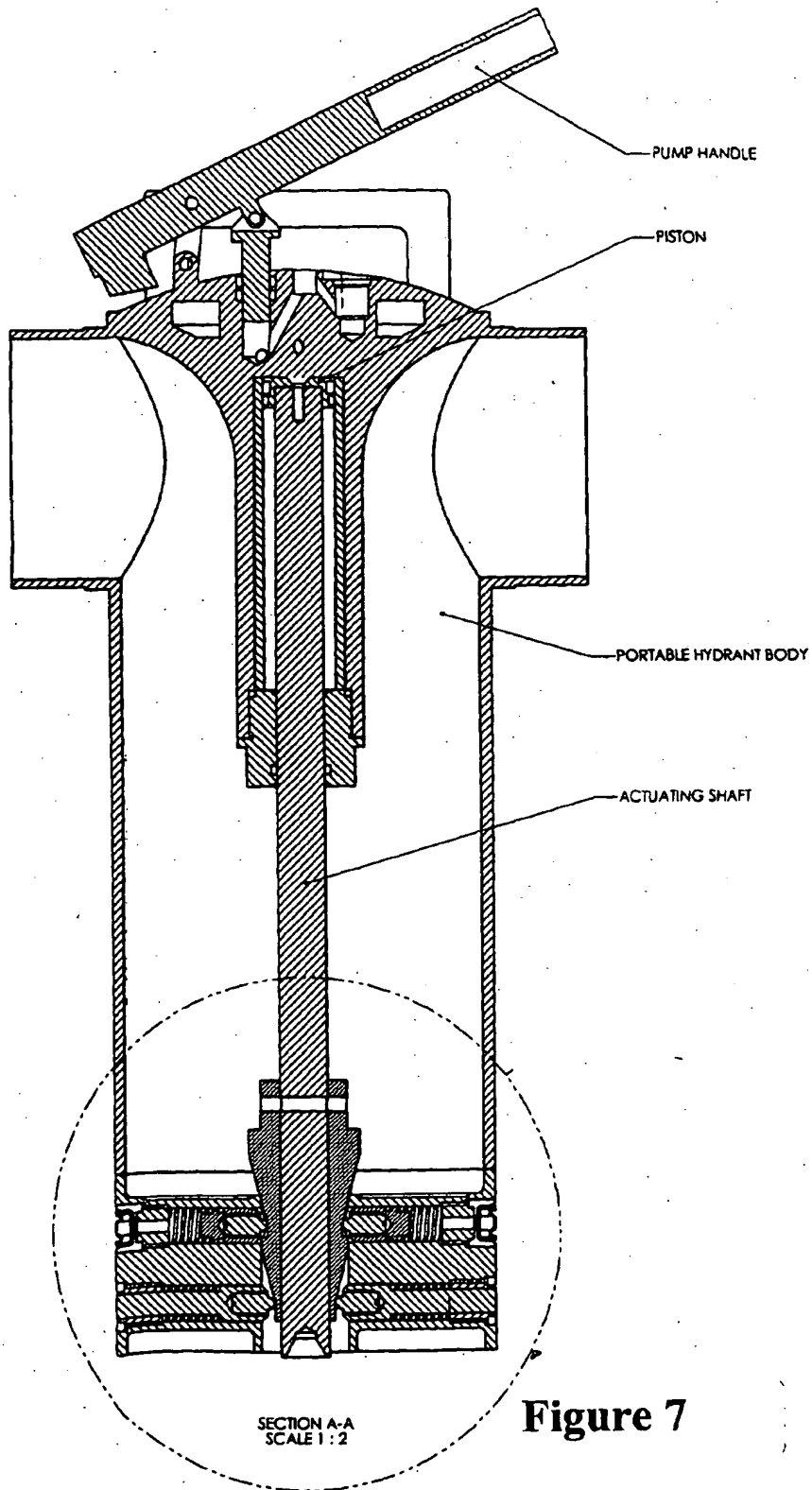
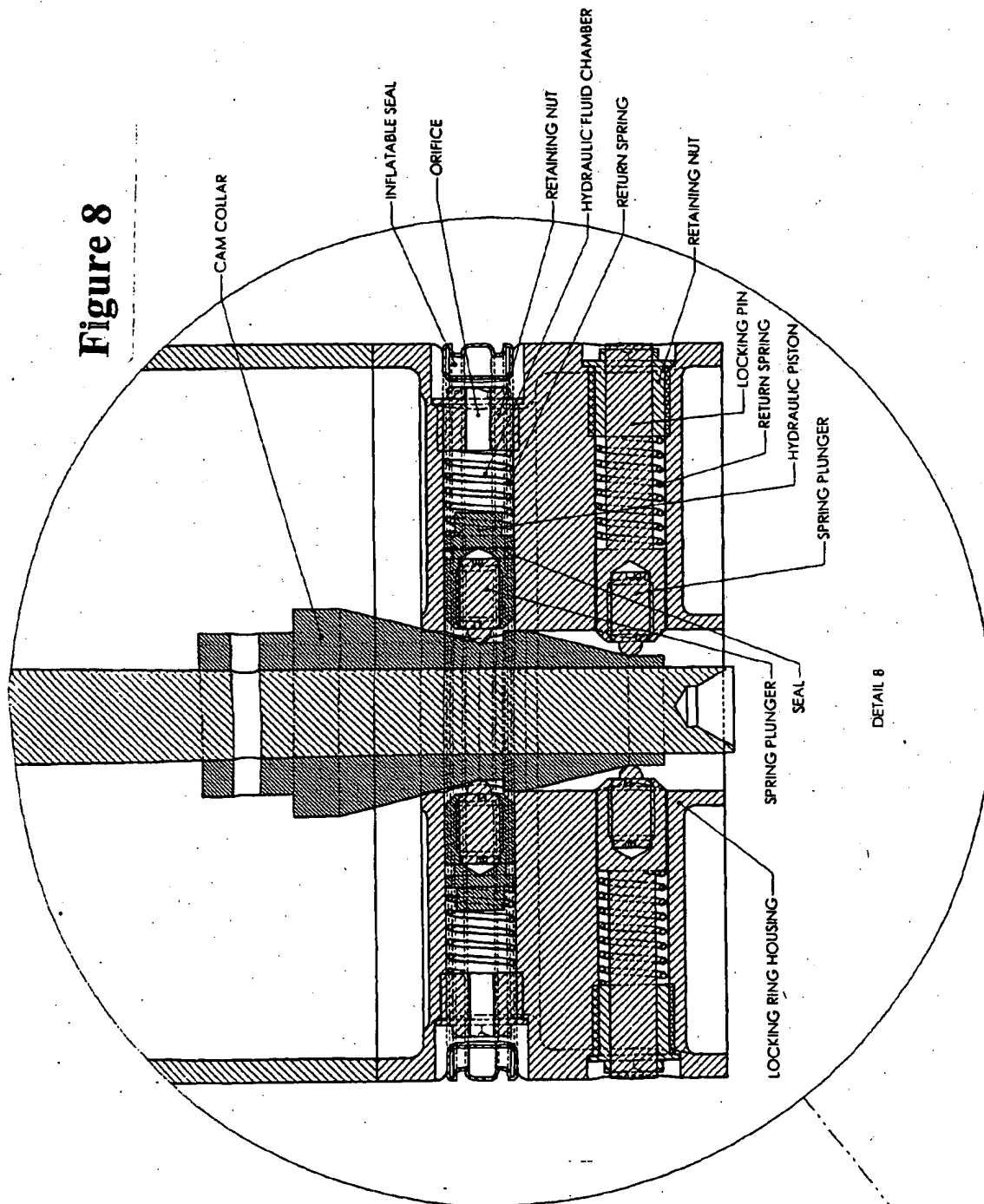


Figure 7

## Figure 8



Docket No.: PDC-0009

App No.: Not yet assigned

Title: Improved Engagement Mechanism for Portable Fire Hydrant

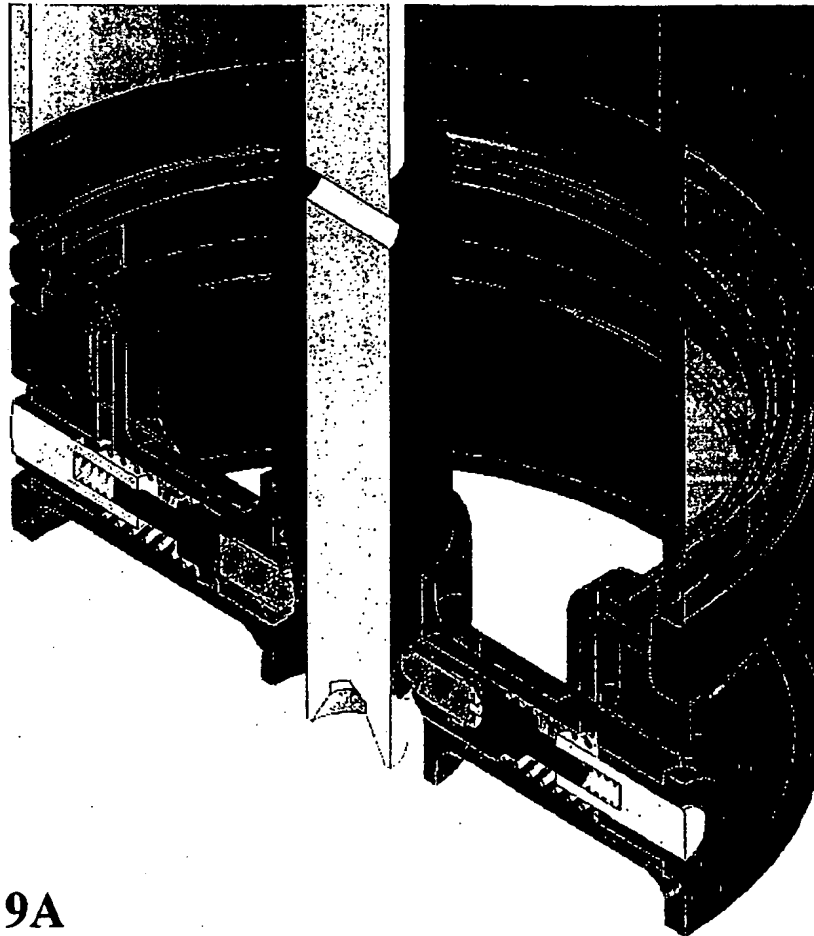
Inventors: Wayne Edwin Miller

Attorney: Daniel D. Biesterveld

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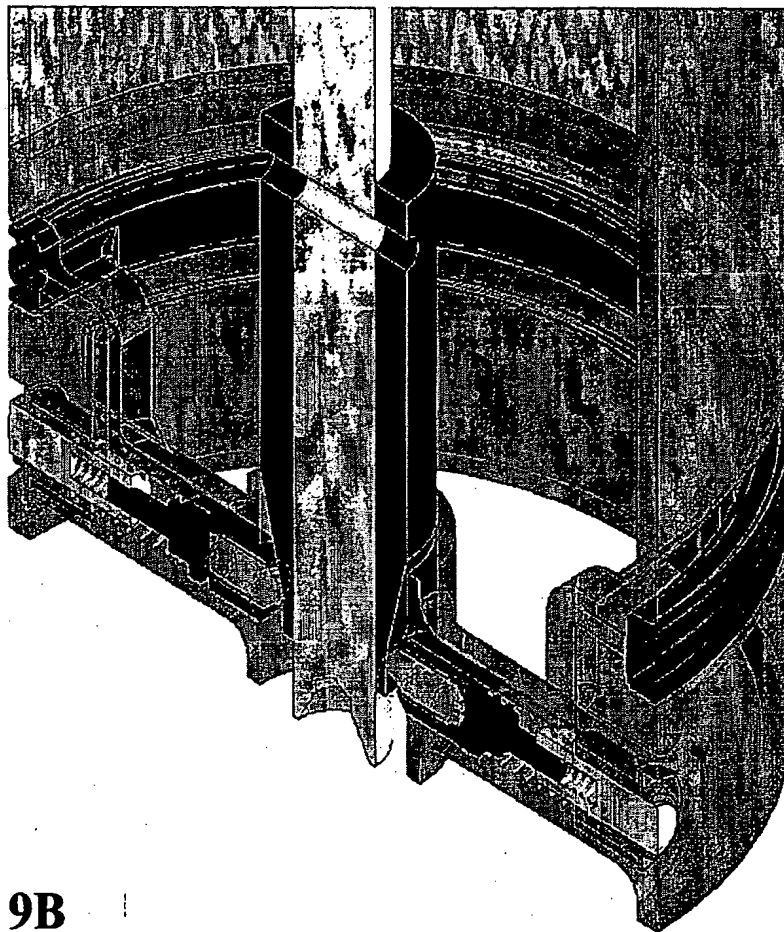
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**Figure 9A**

SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL



**Figure 9B**

SECTION VIEW OF MECHANICAL PIN LOCK WITH INFLATABLE SEAL

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App No.: Not yet assigned

Title: Improved Engagement Mechanism for Portable Fire Hydrant

Inventor: Wayne Edwin Miller

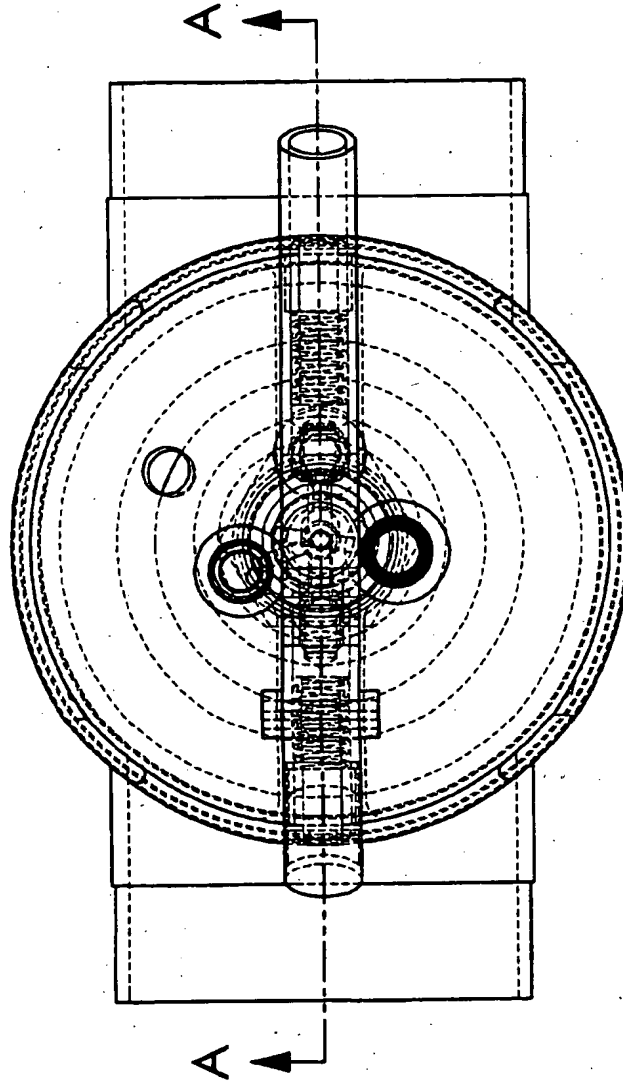
Attorney: Daniel D. Biesterveld

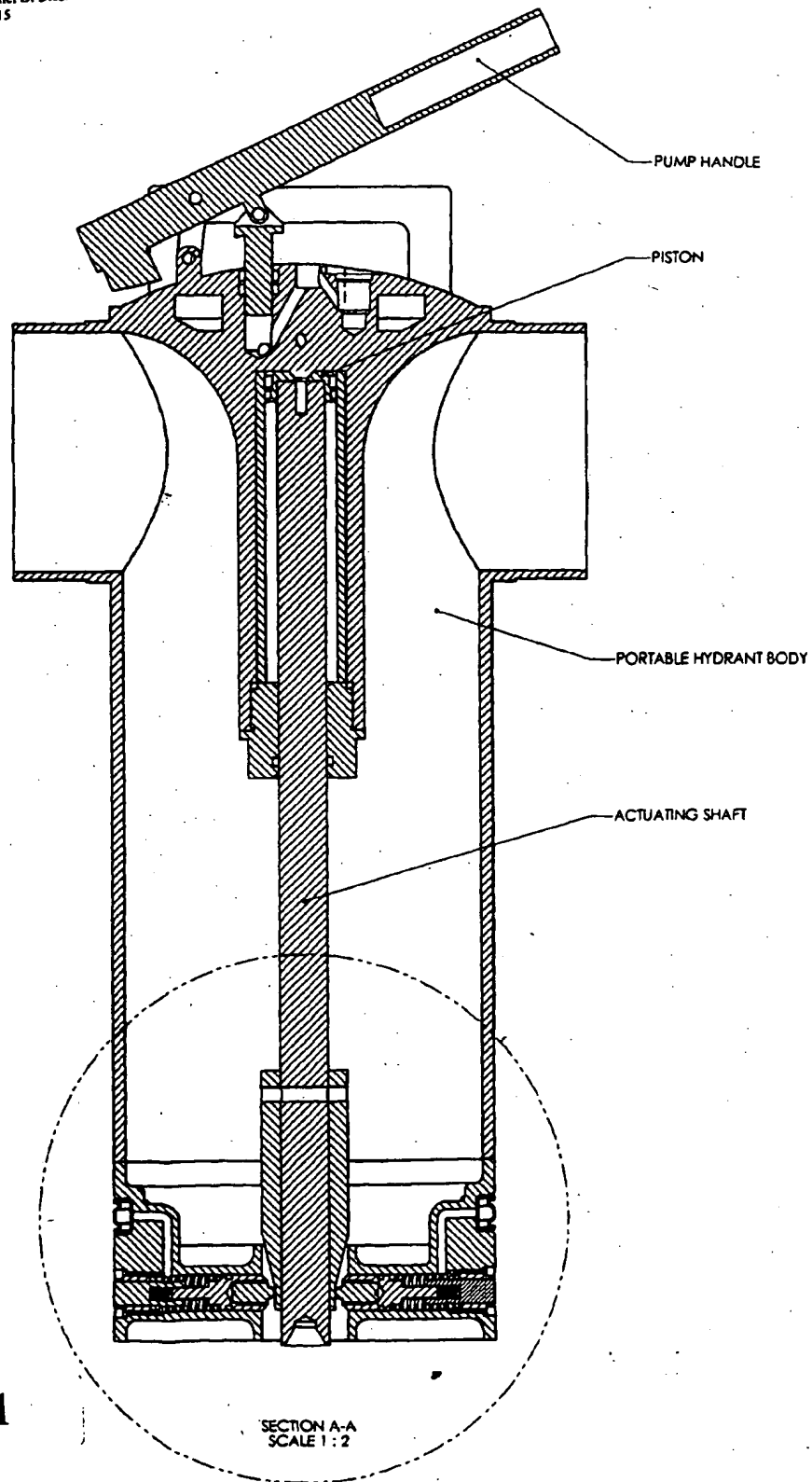
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**Figure 10**





**Figure 11**

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App No.: Not yet assigned

Title: Improved Engagement Mechanism for Portable Fire Hydrant

Inventors: Wayne Edwin Miller

Attorney: Daniel D. Biesterveld

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Figure 12

